ECHOCARDIOGRAPHY TECHNIQUES II EXAM 2 PRACTICE (SAMPLE)

STUDY GUIDE

SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

Questions

1. **Contrast diagnostic: compare Teichholz and Simpson methods for EF estimation and when each is preferred.**
   - A. Teichholz uses LV internal dimension measurements and is less accurate with regional wall-motion abnormalities; Simpson uses 2D volumes and border tracing, generally more accurate, preferred when image is adequate.
   - B. Teichholz uses 3D volumes; Simpson uses M-mode.
   - C. Teichholz uses 2D border tracing; Simpson uses ejection fraction from Doppler.
   - D. Teichholz uses myocardial strain analysis; Simpson uses invasive measurement.

2. **What is the normal PHT range for the mitral valve (MV)?**
   - A. 60-100 m/s
   - B. 3-60 m/s
   - C. 150-219 m/s
   - D. >220 m/s

3. **What does Qp:Qs quantify in the context of shunts?**
   - A. The magnitude of shunt by comparing pulmonary to systemic blood flow.
   - B. The ratio of LV to LV volumes.
   - C. The ratio of pulmonary to left atrial pressures.
   - D. The ratio of regurgitant fractions.

4. **What is the normal left atrial volume index (LAVI), and why is LA size clinically important?**
   - A. LAVI ≤34 mL/m^2; LA enlargement associates with chronically elevated LV filling pressures and adverse outcomes.
   - B. LAVI ≤25 mL/m^2; LA size is not clinically significant.
   - C. LAVI ≤50 mL/m^2; LA enlargement is protective.
   - D. LAVI ≤40 mL/m^2; LA size has no prognostic value.

5. **Which set of findings is most consistent with aortic stenosis on 2D echocardiography?**
   - A. Pulmonary edema, dilated right heart, and normal LV hypertrophy
   - B. Normal heart size with no LVH
   - C. Systolic bowing of the aortic root, oval-shaped opening, LV hypertrophy, left atrial enlargement, and post-stenotic dilation of the ascending aorta
   - D. Only posterior wall thickening

6. Stroke volume is calculated by which formula?

A. SV = CSA + VTI

B. SV = HR x VTI

C. SV = CSA x VTI

D. SV = CO / HR

7. What MVA range corresponds to mild MS?

A. 1.6-2.0 cm^2

B. 0.8-1.2 cm^2

C. 2.0-2.4 cm^2

D. 2.5-3.0 cm^2

8. What is a key limitation of the Teichholz method for EF estimation?

A. It is more expensive and time-consuming.

B. It is less accurate when regional wall-motion abnormalities are present.

C. It requires 3D imaging only.

D. It cannot be used for dilated ventricles.

9. How do you ensure accurate LVOT diameter measurement to minimize error in AVA?

A. Measure at the mitral annulus in diastole.

B. Measure at the LVOT annulus in parasternal long-axis, mid-systole, inner-edge to inner-edge.

C. Use outer-edge to outer-edge measurement in apical view.

D. Measure at the apex with M-mode.

10. The right ventricular diastolic pressure range is which of the following?

A. 0-5 mmHg

B. 12-20 mmHg

C. 2-8 mmHg

D. 60-90 mmHg

Answers

1. A
2. B
3. A
4. A
5. C
6. C
7. A
8. B
9. B
10. C

Explanations

1. **Contrast diagnostic: compare Teichholz and Simpson methods for EF estimation and when each is preferred.**

   A. Teichholz uses LV internal dimension measurements and is less accurate with regional wall-motion abnormalities; Simpson uses 2D volumes and border tracing, generally more accurate, preferred when image is adequate.

   B. Teichholz uses 3D volumes; Simpson uses M-mode.

   C. Teichholz uses 2D border tracing; Simpson uses ejection fraction from Doppler.

   D. Teichholz uses myocardial strain analysis; Simpson uses invasive measurement.

Estimating EF hinges on how the ventricle's size and shape are measured. Teichholz calculates EF from LV internal dimensions, usually using M mode measurements, and applies a geometric formula assuming a relatively symmetric LV. Because it relies on a simplified shape, its accuracy drops when there are regional wall-motion abnormalities—the ventricle isn't the expected geometry, so the estimate can misstate EF. Simpson's method, by contrast, uses two-dimensional border tracing to derive end-diastolic and end-systolic volumes from apical views, then computes EF from those volumes. This approach does not assume a single, uniform shape and tends to be more accurate when endocardial borders are well visualized and the image quality is good. So this option correctly notes that Teichholz uses LV internal dimension measurements and is less accurate with regional wall-motion abnormalities, while Simpson uses 2D volumes with border tracing and is generally more accurate, preferred when the image is adequate. The other statements misstate the techniques (for example, Teichholz isn't 3D volumes or border tracing, Simpson isn't based on Doppler EF, and neither method relies on invasive measurement).

2. **What is the normal PHT range for the mitral valve (MV)?**

   A. 60-100 m/s

   B. 3-60 m/s

   C. 150-219 m/s

   D. >220 m/s

Pressure half-time is a time interval, not a velocity. It measures how quickly the transmitral pressure gradient falls in early diastole and is used to estimate mitral valve area (MVA) with the equation MVA = 220 / PHT (in milliseconds). The normal range for PHT is about 40–60 ms. This corresponds to a normal MVA roughly in the 4–6 cm² range. As PHT lengthens, the valve area decreases (more stenotic); as PHT shortens, the valve area increases. The options listed use velocity units (m/s), but PHT is a time value, so those choices aren't in the correct units. In practice, you'd report PHT in milliseconds and apply it to the MVA calculation to assess mitral stenosis severity.

3. What does Qp:Qs quantify in the context of shunts?

A. The magnitude of shunt by comparing pulmonary to systemic blood flow.

B. The ratio of LV to LV volumes.

C. The ratio of pulmonary to left atrial pressures.

D. The ratio of regurgitant fractions.

Qp:Qs is the ratio of pulmonary blood flow to systemic blood flow, used to gauge how large a shunt is. It reflects how much blood is circulating through the lungs compared with the body, which tells you the magnitude of a left-to-right shunt. When the ratio is about 1, there's no significant shunt; as it rises above 1, more blood goes through the pulmonary circulation than the systemic circulation, indicating a larger shunt. In practice, this ratio is often estimated from Doppler measurements of stroke volumes across the pulmonary and aortic valves: Qp equals the pulmonary valve cross-sectional area times its velocity-time integral, and Qs equals the aortic valve cross-sectional area times its velocity-time integral; the ratio of these two gives Qp:Qs. Accurate measurement is essential because errors in valve size or VTI can skew the ratio.

4. What is the normal left atrial volume index (LAVI), and why is LA size clinically important?

A. LAVI ≤34 mL/m^2; LA enlargement associates with chronically elevated LV filling pressures and adverse outcomes.

B. LAVI ≤25 mL/m^2; LA size is not clinically significant.

C. LAVI ≤50 mL/m^2; LA enlargement is protective.

D. LAVI ≤40 mL/m^2; LA size has no prognostic value.

Left atrial size, expressed as the left atrial volume index (LAVI), reflects how chronically the left ventricle has been under load from filling pressures. Measuring it and indexing to body size makes the value comparable across individuals. A normal LAVI is about 34 mL/m^2 or less. When the LA enlarges, it signals chronically elevated LV filling pressures, often due to diastolic dysfunction or sustained volume overload. This remodeling isn't just a passive change; it carries prognostic weight—LA enlargement is associated with worse diastolic function, higher risk of atrial fibrillation, stroke, heart failure hospitalizations, and increased mortality. Therefore, the threshold of ≤34 mL/m^2 defines normal, while enlargement indicates adverse cardiovascular risk. The other statements propose incorrect thresholds or deny the prognostic significance of LA size, which contradicts established clinical evidence.

5. Which set of findings is most consistent with aortic stenosis on 2D echocardiography?

A. Pulmonary edema, dilated right heart, and normal LV hypertrophy

B. Normal heart size with no LVH

C. Systolic bowing of the aortic root, oval-shaped opening, LV hypertrophy, left atrial enlargement, and post-stenotic dilation of the ascending aorta

D. Only posterior wall thickening

Aortic stenosis creates a pressure overload on the left ventricle, and the heart initially responds with concentric hypertrophy to generate higher systolic pressures needed to push blood through the narrowed valve. On 2D echocardiography this shows up as increased LV wall thickness (LV hypertrophy). Over time, the stiff, hypertrophied left ventricle raises filling pressures, leading to left atrial enlargement. The high-velocity jet through the stenotic valve also distorts flow in the aorta, producing post-stenotic dilation of the ascending aorta and characteristic contour changes such as systolic bowing of the aortic root and an oval-shaped orifice at the valve. Put together, LV hypertrophy, LA enlargement, post-stenotic aortic dilation, and the described aortic root/valve morphology form the pattern most consistent with aortic stenosis on 2D echo. The other patterns don't fit because they either miss the LV hypertrophy and LA enlargement expected with chronic pressure overload, or they describe findings more aligned with other conditions (for example, normal heart size without LVH, or isolated posterior wall thickening, which isn't the typical diffuse LVH seen with AS, and findings like pulmonary edema with a dilated right heart point to different pathophysiology).

6. Stroke volume is calculated by which formula?

A. SV = CSA + VTI

B. SV = HR x VTI

C. SV = CSA x VTI

D. SV = CO / HR

Stroke volume is the volume of blood ejected by the ventricle with each heartbeat. In echocardiography, its typical calculation is the product of the left ventricular outflow tract cross-sectional area and the velocity-time integral of flow through that tract during systole: SV = CSA × VTI. To apply this, measure the LVOT diameter to compute CSA = π (D/2)^2, and obtain VTI from the Doppler waveform through the LVOT, which reflects how far the blood travels during systole. The units line up so the result is in milliliters when CSA is in square centimeters and VTI in centimeters. This approach directly links the physical volume moved per beat to measurable geometric and flow parameters. The other formulas don't yield volume with consistent units: adding CSA and VTI is dimensionally wrong; HR × VTI isn't a volume; CO ÷ HR would only give SV if CO were known, which isn't the standard direct method.

7. What MVA range corresponds to mild MS?

A. 1.6-2.0 cm^2

B. 0.8-1.2 cm^2

C. 2.0-2.4 cm^2

D. 2.5-3.0 cm^2

In mitral stenosis, how severe the narrowing is is defined by the mitral valve area. The usual cutoffs are: mild is greater than about 1.5 cm^2, moderate is roughly 1.0–1.5 cm^2, and severe is less than 1.0 cm^2. Normal mitral valve area is around 4–6 cm^2, so any value well above 1.5 cm^2 reflects only a small decrease in opening. A mitral valve area of 1.6–2.0 cm^2 sits just above that mild threshold, making it clearly mild stenosis. It indicates only a mild reduction in orifice size, typically with minimal symptoms and less impact on hemodynamics at rest. Measurements can be obtained directly via planimetry on the 2D short-axis view or estimated with the pressure half-time method, though planimetry is often more straightforward for grading severity. Lower values, approaching or falling below 1.5 cm^2, would shift toward moderate or more severe stenosis.

8. What is a key limitation of the Teichholz method for EF estimation?

A. It is more expensive and time-consuming.

B. It is less accurate when regional wall-motion abnormalities are present.

C. It requires 3D imaging only.

D. It cannot be used for dilated ventricles.

The method for estimating EF with Teichholz relies on a simple, uniform-geometry assumption: the left ventricle is a symmetric cavity that contracts evenly. It uses measurements of the LV internal diameter at end-diastole and end-systole to derive volumes, and then EF from those volumes. When regional wall-motion abnormalities exist, this assumption breaks down because parts of the wall don't move normally, distorting the cavity shape. That makes the diameter-based volume estimates unreliable, so EF calculated this way can be inaccurate. In those cases, more comprehensive methods like Simpson's biplane or 3D echo, which accommodate regional dysfunction, provide a truer picture of systolic function. The other options aren't correct because Teichholz is a quick, inexpensive method that uses 2D/M-mode dimensions (not 3D-only), and it can be used in various ventricle sizes, though its accuracy suffers with RWMA.

9. How do you ensure accurate LVOT diameter measurement to minimize error in AVA?

A. Measure at the mitral annulus in diastole.

B. Measure at the LVOT annulus in parasternal long-axis, mid-systole, inner-edge to inner-edge.

C. Use outer-edge to outer-edge measurement in apical view.

D. Measure at the apex with M-mode.

The key idea is that the LVOT diameter used in the continuity equation for AVA must be measured precisely, because the LVOT area is squared in the calculation and small errors become large. The best method is to measure the LVOT diameter at the LVOT annulus in the parasternal long-axis view during mid-systole, using inner-edge to inner-edge, to capture a consistent, relatively circular cross-section of the LVOT. This location and timing minimize variations from aortic valve motion and ensure the measurement reflects the actual flow area at peak systolic flow. Measuring at the mitral annulus in diastole would not represent the LVOT cross-section during systolic flow, and using outer-edge to outer-edge in an apical view is more prone to including adjacent structures and overestimating the diameter. Measuring at the apex with M-mode does not provide a reliable cross-sectional LVOT measurement for the continuity equation.

10. The right ventricular diastolic pressure range is which of the following?

A. 0-5 mmHg

B. 12-20 mmHg

C. 2-8 mmHg

D. 60-90 mmHg

Right ventricular diastolic pressure is the pressure inside the ventricle during filling in diastole. The RV is highly compliant, so it normally fills with only a small pressure. That makes the typical range about 2–8 mmHg. Values in the teens (12–20) suggest elevated filling pressures or reduced RV compliance, seen with conditions like RV dysfunction or pulmonary hypertension, while very high numbers (60–90) would be abnormal and unsustainable. A range of 2–8 mmHg best reflects normal RV diastolic pressure.

Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

https://echocardiographytech2exam2.examzify.com

We wish you the very best on your exam journey. You've got this!